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DATA PROCESSING DIGEST

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# Systems Engineering

## FORMALIZED ANALYSIS TECHNIQUES

*H. B. Ladd and W. P. Markovic, RCA Bizmac*
*Paper presented at Symposium on Computers and Data Processing, Denver Research Institute, August 1957*

The subject of the paper is RCA Bizmac's method of analyzing a customer's potential computer application. The method is divided into three phases.

Phase I. The date gathering phase reviews the customer's organization charts, then breaks each area down to its lowest level. A coding scheme is used to identify and relate each unit on the organization chart. The same coding scheme is used to identify the documents used in each area. Documents are also coded as to type (input, intermediate, reference, output), and placed in folders by organizational unit. Documents are usually collected during department interviewing. Interview forms have been developed to aid in this activity. The forms include information on source and destination, volumes, frequency or time cycle, average and maximum number of items for all documents. Cost analyses are made from a breakdown of clerks' time. Now flow charts are prepared. Three types of charts have been developed to give the needed information:

1. Narrative description in center of chart with inputs listed on left, outputs on right.

2. Document grid for each major area of activity, with input documents listed down left side, various records and output documents across top. This shows the multiple use of source documents, redundancy in intermediate documents, common use of basic records, integration of data processing.

3. Data processing cycle of individual key documents.

CONTENTS

1 *Systems Engineering*
3 *General Information*
10 *Applications*
13 *Programing*
14 *Equipment*
14 *Management Decision-Making Techniques*
15 *References*
16 *Comment*
17 *Resource*
18 *Training*
20 *Meetings*

*Phase II—Design based on file and run organization*

Phase 2. Design of the system is based on two important considerations: organization of files, and organization of runs. In file organization, key documents are analyzed in terms of data usage and content. A chart is made for each set of documents, with each item of data listed across the top and the documents listed along the side. The average number of characters per item is listed in the grid opposite the document in which it appears.

The organization of runs is proceeding at the same time. New system flow charts are made which locate and eliminate repetitions in operations. A data sheet is prepared for every input, output, and reference file in the proposed system. Each item of data in this chart is described in terms of character counts, percent of use, and weighted average. These figures are used to take advantage of the variable word length and message length concepts in the Bizmac system, and to determine tape lengths, storage requirements, and estimated operating times during the third phase.

Phase 3. Evaluation of the system is usually related to the equipment capabilities of an existing system. During this phase, the areas being studied are analyzed in greater detail. An important part of the evaluation is based upon the reactions of the personnel who have been interviewed during the study.

## TECHNIQUE OF SYSTEMS AND PROCEDURES

*H. John Ross*
*Published by Office Research Institute*

*A basic text for the systems student*

One of the requisites for a well-planned EDP system is the basic excellence of the business system utilizing the electronic equipment. For persons aspiring to a career in this field, there is the necessity for learning how such an excellence may be achieved. Here is a book for the Systems and Procedures student, whether he is about to enter the business world, or has been in it and sees a need for improvement in his present situation.

This author has a way of stating the most nebulous subject matter in a straightforward, understandable, and even entertaining style--a teaching method which makes his subject quite easy to assimilate. This text book, in spite of a rather unwieldy size and the simplest of production methods (photo-offset typed copy), holds the reader's interest throughout. It begins with a definition and description of the Systems function, then progresses through the methods and techniques, and--more important--the reasons why of systems design. It includes the practical aspects of human relations in the systems engineer's contacts with supervisory and regular personnel; and pro-

vides many suggestions for self-evaluation of the systems man's own personality. The first 190 pages are devoted to the general outline of the Systems function and its design. The last 150 pages are concerned with specific instructions on the design and use of procedure charts, forms, and procedure manuals. One chapter in this section is devoted to techniques of work simplification. A Glossary concludes the book.

Price: $15.00

# General Information

## FALSE STARTS IN OFFICE AUTOMATION

*John Diebold*
*THE MANAGEMENT REVIEW, July 1957; pages 81-88.*

Many of the problems which have frustrated management in realizing the full potentials of their electronic computer installations are the result of two major managerial errors.

*Committee study tends to emphasize hardware*

The first of these errors is the concentration on hardware rather than on the system. "Although the scope of the automation problem encompasses virtually all areas of the business organization, the nature of the analysis and the decisions that must be undertaken... does not lend itself well to committee organization. These are operational problems and should be treated as such.... The problem of automation should be specifically assigned as the responsibility of an operating executive." Delegating authority to a committee "usually leads the company to approach automation from the standpoint of technology or hardware.... The very phrase 'feasibility study'... frequently serves to imply...that they are trying to find an application for a computer. Their objective should be to design the best possible information and communication system for meeting the needs of the organization, whether it relies upon a computer, a simple manual and machine system, or entirely upon humans."

The second error is the delegation of important decisions to technical people, rather than to those thoroughly familiar with the business itself. The introduction into a company of "experts" who would be considered "floaters" in any other field, "has the same consequences as the violation of any other sound personnel policy.... The solution is to train personnel from your own organization in analytical procedures, machine operation, and programming.... The installation of automation equipment cannot properly be made without a thorough understanding of the functions and needs of the business itself."

A common method of proceeding with the study is the step-by-step method, which term "is intended to convey the impression of caution and proper business reserve. Actually, it often means that another uncoordinated misstep is being taken into automation." ((See also: "What is the Cloud 9 Approach?" in DPD, August 1957, page 14.))

"The step-by-step approach frequently ignores the fact that the whole concept of systems analysis and design, which is basic to automation, requires a careful and detailed plan for the entire organization if the benefits realized are to be more than marginal.... This analysis must precede evaluation of equipment: you begin with the system, not with the machinery. Such a study often results in great improvements and substantial savings, even when automatic machinery is not installed.

"One result of treating the computer as just another tabulating machine and not integrating it into the business system is that the high costs of data-preparation often reduce or eliminate any savings that result from automatic processing. On many existing computer installations, a substantial portion of the savings has been made possible by deriving data automatically from a process as a by-product. This eliminates the extensive key-punching or other data-preparation costs that are encountered when the computer is considered only a new, faster, and more automatic addition to the tabulating room."

However, it is important for management to be familiar with the machines that are available, since "a knowledge of existing equipment which fits the needs of the system is obviously necessary to the successful accomplishment of the conversion to automation."

## NEVER OVERESTIMATE THE POWER OF A COMPUTER

*Ralph F. Lewis, Arthur Young & Co.*
*HARVARD BUSINESS REVIEW, September-October, 1957; pages 77-84.*

The significant sub-title is: "It can do the calculating, but it can't do the planning." Four reasons are given for the majority of orders for EDP systems up to the present: "to keep up with the Joneses; to see what can be done with computers; to obtain identifiable cost savings; to obtain better or faster information." An example of each type of motive is given, identified only as Company A, etc. If you have kept up with the literature in the field, it will not be difficult to identify the companies. In commenting on the motives, the author makes the following statements:

"The net gains of transferring an already mechanized operation to the computer will rarely bring any advantage. To produce better facts for management means an entire study of management

problems. In many instances such a study may well result in formulating a complete new system of processing paper work." This is followed by the example of Company D (the fourth motive above).

"The sound way of approaching a computer installation is to determine first of all what information management really needs and how fast... Priorities must be established as to which items of information can be of most benefit. At that point, detailed systems work should be started."

*What applications will pay their way?*

"Normally, no single application will economically carry the cost of a computer system. Only in a few specialized areas can a computer pay its way on a single operation--for instance, the mass-volume, fairly complicated problem of public utility billing and revenue accounting, or some of the volume operations of the larger insurance companies, such as premium billing and actuarial studies. In most situations economic results can be obtained only by programing a multiapplication installation.

"This does not necessarily mean, however, that those operations now being handled efficiently on tabulating equipment can be profitably put on computers. As a matter of fact, the best possibilities are those volume operations which have defied economic tabulating systems."

*Payroll is not the money-saving application it seems to be*

Although the most popular of the applications initially placed on a computing system, payroll "is normally not a profitable computer application." An example is given of a well-known company which started with a huge payroll application, and is now "quietly decentralizing the payroll operations, moving them back to conventional equipment, and substituting more worthwhole operations on the computer." The author has found few computer systems now in use which could be considered as economic. "The number that are paying their way at this point can be counted on one hand, with some fingers left over." However, "in addition to the ever present payroll installations, headway is being made in such potentially profitable areas as inventory control, production control, sales accounting, and in such previously mentioned specialized fields as public utility billing and insurance accounting."

Four "don'ts" conclude the article:

"Don't order to keep up with the Joneses. Don't switch established tabulating routines to the computer. Don't expect that one application will pay for the computer. Don't accept delivery until you are really ready."

## A MANAGEMENT GUIDE TO ELECTRONICS

*William D. Bell*
*Published by McGraw-Hill Book Company, 1957*

Several authors, including this one, have been able to present the "hardware" aspects of electronic computers in a calm, honest, and clearly understandable manner. Such descriptions have been appearing for the past two years in a number of good books for business management.

In this one, about half the contents are devoted to the equipment and its preparation for use. The first 138 pages are devoted to "hardware" and to explanations of computer logic and control. Good, relatively simple evaluations are made of memory devices, of magnetic tape problems, and of input-output equipment.

*Sample problem is programed for three computing systems*

Programing is covered quite clearly in a chapter which takes the novice from a simple example of telling a mechanical man how to cross the room and pick up a paper, to a real problem, the checking of Dow Jones averages to see if a cyclic pattern can be found. The latter problem has been flow charted and programed by IBM, Remington Rand, and Marchant. An interesting half-hour may be spent by the reader comparing the different approaches of the three companies to the same problem.

When the author comes to the real heart of the book--how does management go about planning for electronics?--we feel he falters somewhat. Chapter 10 attempts to answer some questions, such as: are electronic computers ready for business applications? what about obsolescence? should we buy or rent? and other questions important to management. Chapter 11 suggests a plan for reaching a decision, divided into two phases. Phase 1 has eight steps covering assignment of responsibility, decision on calling in a consultant, training and education, survey of equipment, application studies, and costs.

*System design is not adequately covered*

Buried among these eight steps is an area of the study which we consider of primary importance. This is step 7: "Applications studies. Where and how can an electronic system be used within the organization." In our opinion, the method of approaching this step and the problems that are generally encountered are not clearly presented; rather, the author seems to sum up the situation as: this is a step which must be done. In the one-page discussion of this important aspect, we feel that the author implies the use of the "equipment substitution" approach (although this point is not definitely made) wherein present procedures are largely copied and transferred to the EDP system and the approach of laying out of a more integrated system is not considered. Thus, there seems to be no real discussion of how management can decide between the two approaches.

Let us mention one important point, however, which we notice John Diebold also makes (see: "False starts in office automation," DPD this issue, page 3). That is, do not depend upon a

"committee" to carry the entire responsibility for investigating and installing an electronic system. In initial phases, a committee composed of representatives from the departments likely to be affected will be of value. But the final responsibility for setting up the system must be assigned to one man high on the management scale. This point is made in the phase 2 portion of chapter 11.

*Case histories*

The last 145 pages are devoted to case histories of the best known installations of electronic equipment. These offer the inquiring management an interesting view of a variety of electronic systems, and suggest some of the problems inherent in their planning. The case histories include special applications such as the John Plain inventory system, and the American Airlines Reservisor, operations research applications such as General Electric's production scheduling, inventory control applications at Lockheed and Chrysler MoPar, insurance, payroll, accounting, and a picture story of a computer installation procedure.

Price: $6.50

**PROCESSING A PAYROLL BY COMPUTER**

**AUTOMATION MISUNDERSTOOD**

**CANADA'S FIRST 705 COMPUTER CLIMAXES CPR'S IDP PROGRAM**

**PERTINENT INFORMATION—ABOUT SOME OF THE BETTER KNOWN COMPUTERS**

*OFFICE EQUIPMENT NEWS, July 1957*

A group of short articles about EDP in Canada is contained in this issue. The first is a conventional application of the IBM 650 to a payroll problem. In the second article listed here, John Diebold's remarks to the International Management Congress are summed up. He pleads for management's consideration of automation as a management tool rather than merely a labor-saving technique.

Canada's first "705" computer is being used to process Canadian Pacific Railroad's freight, payroll, and materials functions, through the central computer at Montreal and eight District Data Centers.

The last of the articles listed is a chart, dated April 1957, which contains monthly rental rates, input and output equipment and speeds, and storage characteristics of 22 electronic computers.

## A BIGGER ROLE FOR THE CLERKS?

*RAILWAY AGE, July 29, 1957; pages 19-23, 48.*

The implications of railroad office automation for labor is the subject of an interview with George Harrison, Grand President of the Brotherhood of Railway Clerks. Mr. Harrison wants the railroads to bring the Brotherhood into the planning of the EDP system as soon as approval for the system is given by management. He feels that consideration of the rights of employees should be an integral part of the planning. He objects to the practices of railroads which "have ignored the rights of the employees and have moved unilaterally in the planning, organizing, and executing of mechanization plans. Generally they have brought in people from outside the industry, sent them to school and trained them in computer application procedures ....employees have been required to teach the outsiders the details of their...jobs in order that such outsiders can document...each job and code the work in the computer language....In the main, carriers have resorted to the employment of outsiders to take over the work of conversion to mechanization....Such methods have been extremely short-sighted [and] result in considerable unnecessary expenditure ...because the outsiders have to be taught how to railroad before being able to perform the functions taught them at the computer schools."

## PROCEEDINGS OF COMPUTER APPLICATIONS SYMPOSIUM

*Armour Research Foundation, October 1956.*

We can begin to see the speed with which the EDP field is developing when we read proceedings which are published many months after the meeting concerned. In this group of papers it appears that the broader concept of computer use was still a far-fetched idea of the academicians (at least in the opinion of most computer users). The examples given in the individual papers are almost entirely extensions of tab operations to faster electronic equipment. When Dr. Carr of the University of Michigan dared to reprove the speakers for considering the equipment as "just another office machine, and...nothing but a continuance of tabulating techniques," he precipitated a heated discussion on the human characteristics of the "giant brain." Even those who considered the equipment had more potential than a fast tab system were preoccupied with the hardware, rather than with the business system being processed.

Price: $3.00. Order from Armour Research Foundation, 10 West 35th Street, Chicago 16, Illinois.

## MUSIC TRANSPOSITION BY COMPUTER

*COMPUTING NEWS, September 1, 1957*

Automatic transposing may soon relieve music arrangers of much drudgery. CN's editor has been working with a member of the Seattle Symphony Orchestra in programing music transposition for a computer. In this article, a simple program and flow chart is given for transposing part of a Christmas carol from the oboe to the English horn. The Burroughs E 101 was used. It is also suggested that plotting versions of both the Univac printer and the IBM 407 tabulator may be used for actual printing of the transposed music.

## ELECTRONIC DATA PROCESSING—A NEW APPROACH TO A NEW TECHNIQUE

*Kenneth S. Most*
*THE ACCOUNTANT, July 13, 1957; pages 32-34.*

Readers in England may be interested in the new view of accounting by electronics expressed in this article. Bookkeeping is conceived as "recording the movements taking place within a business while it is functioning.... movement of goods, movement of cash (credit), movement of employees (labor performance), movement of machines (machine performance).... If these movements can be metered, so that they are recorded when they are made, we should arrive at a very important advance, namely, the merging of originating and processing data." This kind of a system would not be based on the traditional production of monthly statements, but rather on the status of the business at any one moment.

## DATA PROCESSING SYSTEMS AS AN AID TO MANAGEMENT

*N. D. Hill*
*THE INSTITUTION OF PRODUCTION ENGINEERS JOURNAL, August 1957; pages 510-514.*

A brief description of ways in which an electronic computing system may be used for business includes "management by exception," wage calculation, control of stocks, data processing in banking, application to production control, and linear programing. Readers in England will find this of interest.

## GETTING READY FOR A COMPUTER

*Peter Spooner*
*BUSINESS, June 1957; pages 53-58.*

This case history of the installation of an electronic business system by the Morgan Crucible Co. Ltd. in London, follows the pattern set by the majority of companies in the U. S., that of converting present systems to the computer system. The computer selected was the Hollerith Hec 4 general purpose computer; it was the first production model of this manufacturer.

# Applications

## AIRLINE AUTOMATION: A MAJOR STEP

*C. E. Ammann, American Airlines*
*COMPUTERS AND AUTOMATION, August 1957; pages 10-14, 30.*

Here is a fascinating case history of the American Airlines Reservisor, from the original availability problems which spawned it, to the future plans for the companion Reserwriter. The author is the man who was responsible for analyzing the problem and seeing the solution in terms of inventory control. The first seat availability equipment was built in 1946, before Dr. Howard Aiken's work on the magnetic drum at Harvard University. When the drum became available, the Reservisor was designed for American Airlines by Teleregister, in essentially the same form in which it is being used today.

*The Reservisor—answer to specific airlines problems*

Although too detailed and specialized an article to abstract at length, several examples of the problems encountered and their solution can be mentioned.

One of the most important aspects of the system was the need for accuracy. This was obtained in several ways. For example, "although packing factors of 80 or more to the inch [in the drum memory] were common at the time, we packed 20 to the inch. We used dual drums...dual equipment throughout...each transaction was completed in duplicate...." A teletype printer printed out a record of the discarded transactions so the maintenance group could analyze the situation. These safeguards have resulted in 99.8% up-time.

Another problem was the design of the Agent Set. Passengers are usually not familiar with flight numbers, but only where they want to go and when. Also, there was a need to accomodate a passenger on an earlier or later flight if the one he wanted was full. The solution was the Destination Plate, a coded template which is inserted into the Agent Set. Arrival and departure information was needed also, but it was some time before its relation to reservation information was realized. This resulted in the addition of a fixed display on the Agent Set to be read by means of the leg-indicating lights.

The article is of especial value in depicting the way a company went about analyzing and solving a data processing problem.

## PAY CHECKS BY TELETYPE

*CONTRACTORS AND ENGINEERS, August 1957; pages 14, 15.*

## REMOTE CONTROL PAYROLL SYSTEM BRINGS PERSONNEL ECONOMIES

*AMERICAN BUSINESS, August 1957; page 16.*

F. H. McGraw, a contracting firm with far-flung jobs, is using teletype and paper-tape-to-punch-card methods for preparing pay checks for field employees. At the present time 200 employees at Brewton, Alabama are being paid from computations being made in Hartford, Connecticut. Information is teletyped to Hartford, and checks are teleprinted in Brewton. The company finds this system eliminates the need for trying to find qualified clerical help to work in the field office, a difficult job, particularly in remote areas. Also, the system helps the home office to find out quickly if costs for a particular job are running over estimates. If they are, management can quickly handle the situation.

## SIBLEY'S EXPERIENCE WITH A POINT-OF-SALE RECORDER

*Douglass C. Goupe, Sibley, Lindsay and Curr Co., Rochester, N. Y.*
*STORES, August 1957; pages 15-17.*

Sibley's established a Remington Rand Point O'Sale Recorder system in their new Rochester Eastway Shopping Center. The resulting paper tapes are processed each night at the Remington Rand Punched-Card Records Services in Rochester. The 24 recorders are located in the store to serve several departments, a convenience resulting from the fact that there are no mechanical limitations to the number of clerks or departments which the system can handle. Management at the Eastway store is now getting important reports each morning on the previous day's activities. Other important statistical information is also available more quickly.

## ELECTRONIC INVENTORY CONTROL AT CHRYSLER

*John D. M. White*
*AMERICAN BUSINESS, August 1957; pages 24-26, 39.*

This is a very sketchy and generalized description of the MoPar Chrysler inventory control application, better described in "Application of an electronic data processing machine to inventory control," by Robert P. Beals, Chrysler Corporation. This was a paper presented at the Association for Computing Machinery Annual Meeting, September 1955. ((See DPD January 1956, page 1.))

## COMPUTER APPLICATIONS TO POULTRY FEED

*COMPUTERS AND AUTOMATION, August 1957; page 9*

In a letter to the editor, Mr. Wilbur E. Clark of Hanover, Pennsylvania, tells about the use of a large computer to compute the best combination of feed grains and ingredients for poultry, based on telephoned quotations of the closing Chicago prices. About 10 minutes later the machine begins typing out the information for the milling companies which subscribe to the service, telling them which ingredients are the best buys of the day to make a particular formula feed. In this way they are better able to take advantage of the price situation than by the former manual computation methods. One Company has estimated a saving of over $100,000 a year.

## ELECTRONIC AIRLINE RESERVATIONS

A folder describing the Northwest Orient Airlines reservation system has been printed by Remington Rand Univac. The system uses the Univac File Computer, which provides the ticket agent with immediate access to information on any flight. A layout of the computer system, a close view of the ticket agent set, and a flow diagram of the system are included in the folder. Ask for folder # TM 1087; Remington Rand Univac, 315 Fourth Avenue, New York 10, New York.

## INFORMATION SEARCHING WITH THE 701 CALCULATOR

*R. H. Bracken and H. E. Tillett, U.S. Naval Ordnance Test Station, China Lake, California*
*JOURNAL OF ASSOCIATION FOR COMPUTING MACHINERY, April 1957; pages 131-136.*

A method for indexing documents for simplified automatic search by an IBM 701 is described. The documents are cataloged by the use of "descriptors" (see DPD July 1957; page 6) which give a clue to the contents of the documents (in this case, scientific reports). Each descriptor is given a number and punched on a set of IBM cards together with the report numbers associated with descriptor. Each set of cards is then written on magnetic tape, as a unit record, in ascending order by descriptor number. A special computer program was written to up-date the file. A 704 is planned for future expansion of the system.

## FIRST RR "BRAIN" BEGINS TO HUM

*RAILWAY AGE, July 8, 1957; pages 34-36, 56.*

The "one-shot" electronic system planned by Chesapeake and Ohio ((see DPD: August 1956, pg 1)) has been functioning during the past year in the payroll, stockholder reports, and dividend payments. Future assignments will be rail wear study, freight revenue accounting and coal traffic statistical analyses, sales statistics, traffic patterns, and inventory control.

**GN ADOPTS ELECTRONIC "BRAIN"**

*MODERN RAILROADS, July 1957; pages 99-108.*

The Great Northern Railroad is using a Univac I in a long-range program of integrated accounting operations. At the present time only the payroll operation is being performed on the computer. However, along with each operation being programed for the computer, plans are included for management reports as by-products of the primary operation. A flow chart of the payroll operation is included.

# Programing

**AUTOMATIC CODING SYMPOSIUM—FRANKLIN INSTITUTE**

*COMPUTING NEWS, August 15, 1957*

The announcement of the publication of Proceedings of this Symposium was made in DPD June, 1957. In this article, however, we are provided with a discerning review of the eight papers, along with some significant remakrs by the reviewer from his own experience.

*Automatic programs are being fitted to user's needs*

"If the papers...are reliable harbingers, we have at last broken our tie to the computer. Our approach to automatic coding is now characterized by the following pattern:

1. We need to ease the load on our programmers, so let's develop an automatic programing system.

2. Put that template, pencil, and coding sheet away. Let's discuss principles.

3. Now that we have a language which everyone understands, let's build a coding system around it.

4. The compilation pass takes an hour, ten tape drives, and five operators? Well, that's the way the cookie crumbles."

The fact that this translation, automatic though it may be, takes considerable time, equipment, and manpower is of little consequence, compared with the easing of the programing burden for each new application being designed. The reviewer is encouraged by the new interest shown by manufacturers in building-in automatic programing features in the newer computers.

# Equipment

### ELECTRONIC POSTING OF CHECKING ACCOUNTS

IBM has developed a check posting procedure similar to one developed by the United States National Bank of Portland, Oregon ((see DPD, May 1957, page 10)). The computer used in the system is the IBM 650. Checking accounts are given code numbers which the customer lists on each deposit slip, and which are imprinted on his checks. When the deposit slip or check is processed at the bank, the operator of a combination adding machine-key punch lists the number, dollar amount, and a symbol indicating either debit or credit. At the end of the day the punch cards are fed into the 650, storing the information on the drum memory. Then the previous day's balance cards are fed into the machine, and updated cards are created, four accounts to each card. The new balance cards are run through an IBM accounting machine to print a list of account numbers and current balances. Customer's bank statements are prepared from the punched balance cards in a similar fashion.

# Management Decision-making Techniques

### PROCEEDINGS, SEMINAR ON LINEAR PROGRAMMING AND INVENTORY MANAGEMENT

*Published by Methods Engineering Council, 1956*

Seventeen papers are divided into three sections: General, Linear Programing, and Inventory Management. In the section on Linear Programing, examples of the use of the simplex method and other LP methods are given. These have to do with most efficient use of machines or best distribution lines from warehousing. Suggestions on setting up and operating an OR group is the subject of another paper. Most of the problems described are copiously illustrated with charts. The section on Inventory Management goes into specific problems on inventory, and is well documented with examples and charts. Price of the Proceedings is not stated. For information, write: Methods Engineering Council, 718 Wallace Avenue, Pittsburgh 21, Pennsylvania.

## HOW OPERATIONS RESEARCH TECHNIQUES CAN BE USED BY SMALLER COMPANIES

*John Hockman, Steinberg's Ltd., Montreal, Canada*
*OFFICE MANAGEMENT, August 1957; pages 33, 34, 78, 80.*

A simple production planning problem is given to illustrate the use of linear programing by the smaller company for more efficient use of productive capacity. Five tables are included to show the kind of statistics needed for the problem. Nowhere in the article is the exact method shown, but the possibilities in the new OR methods are suggested.

# References

The addresses of publishers and periodicals mentioned in this issue of DATA PROCESSING DIGEST are listed below for your convenience in obtaining further information about the articles or books listed.

The Accountant
4 Drapers' Gardens
Throgmorton Avenue
London EC2, England

American Business
4660 Ravenswood Avenue
Chicago 40, Illinois

Armour Research Foundation
Illinois Institute of Technology
10 West 35th Street
Chicago 16, Illinois

Computers and Automation
815 Washington Street
Newtonville 60, Massachusetts

Computing News
12805 - 64th Avenue South
Seattle 88, Washington

Contractors and Engineers
470 Fourth Avenue
New York 16, New York

Denver Research Institute
University of Denver
Denver 10, Colorado

Harvard Business Review
Soldiers Field Station
Boston 63, Massachusetts

Journal of Institution
of Production Engineers
10 Chesterfield Street
London W1, England

Management Review
1515 Broadway, Times Square
New York 36, New York

McGraw-Hill Book Co., Inc.
330 West 42nd Street
New York 36, New York

Modern Railroads
201 North Wells Street
Chicago 6, Illinois

Methods Engineering Council
718 Wallace Avenue
Pittsburgh 21, Pennsylvania

Office Equipment News
146 Bates Road
Montreal 8, Canada

Office Management
212 Fifth Avenue
New York 10, New York

Office Research Institute
P.O. Box 744
Miami 43, Florida

Railway Age
30 Church Street
New York 7, New York

Stores
100 West 31st Street
New York 1, New York

# Comment

## COMPUTERS CAN PLAY CHESS (AND SOMETIMES WIN)

From time to time persons associated with computers become involved with the question of whether a computer can be programed to play chess and if so how well. An article by several members of the Los Alamos Scientific Laboratory[1] presents a status report on the situation, which we summarize here as a conversation piece.

*Maniac looks ahead two moves*

The Los Alamos group has programed their Maniac I computer[2] to play a simplified game of chess. They use a 6x6 board with no bishop. Pawns move only one space on the first move and castling is not permitted. With this game the computer can be programed to look two moves ahead, taking an average of 12 minutes per move. (Looking two moves ahead for the real game would take about 10 times as long.) The computer is programed to maximize its material advantage and also its mobility (e.g., one pawn [material] equals 8 legal moves [mobility] in a given position.) These "simple criteria turned out surprising well."

After some trials in which the machine played itself and during which improvements in the program were made, the machine played a good chess player, Dr. Kruskal of Princeton. The computer was given the advantage of a queen and of being white. The game was close for 15 moves and "Kruskal...had even started calling his opponent 'he' instead of 'it.'" The machine lost, however, at about the 22nd move. In another game played against a "young lady...who had learned the game a week before" the machine won in 23 moves, following up on several weak moves by the young lady. Chess players in the group feel the machine's game "could be compared to that of one who has average aptitude...and experience amounting to 20 or so full games played."

What kind of a game will future machines be able to play? Machines with one microsecond order times would not be able to look more than three moves ahead. Yet "most of the weak moves or blunders committed by [the Maniac] can be attributed to its inability to look far enough ahead...." Additional criteria might also improve the game and would require more storage capacity. "It is not our belief that a machine will be made in the near future which could be coded to beat a strong player," says this group.

The power of the human brain to "operate...in many parallel channels...gathering...a great amount of information...and evaluating it is as yet incomprehensible." More studies of games of strategy such as this may give further insight into the "organization of thought."

1. Kister, et al; "Experiments in chess," JOURNAL of ACM, Vol. 4, No. 2, April 1957, p 174 f.

2. Add time: 80 microsecs.
   Memory: 1024 word electrostatic
   10,000 word drum

## Resource

The following periodicals are reviewed regularly by the publishers of DATA PROCESSING DIGEST for significant information in the data processing and related fields.

The Accountant (England)
Accounting Review
Advanced Management
Aeronautical Engineering Review
A.I.E.E. Review
American Business
American City
American Documentation
American Gas Association Monthly
Armed Forces Management
Automatic Control
Automation
Automation Consultants
Automation Progress (England)
Aviation Age
Banking
Bell Laboratories Record
Best's Insurance News
Burrough's Clearing House
Business (England)
Business Week
Chain Store Age (Adm. Edition)
Chemical Week
Computers and Automation
Computing News
Consulting Engineer
Contractors and Engineers
Control Engineering
The Controller
Cost and Management (Canada)
Credit and Financial Management
Credit Executive
Credit World
Current Contents
Data
Data Processor
Department Store Economist
Dun's Review
Electrical Engineering
Electronic Design
Electronic News
Electronic Week
Electronics
Engineering News Record
Factory Management and Maintenance
Forbes
Fortune
Federation Internationale Documentation
Harvard Business Review
Industrial Quality Control
Instrument Society of America Journal
Instruments and Automation
Internal Auditor
I.R.E. Transactions
I.R.E. Proceedings
Journal of Accountancy
Journal of Association for Computing Machinery
Journal of Documentation (England)
Journal of the Franklin Institute
Journal of Industrial Engineering
Journal of Institution of Production Engineers (England)
Journal of Machine Accounting
Journal of Research and Development (IBM Corp.)
Journal of Society for Industrial and Applied Mathematics
Life Association News
Machine Design
Management Methods
Management Science
Mechanical Translation
Merchants Trade Journal
Modern Office Procedures
Modern Railroads
N.A.A. Bulletin
Nation's Business
O. & M. Bulletin (England)
The Office
Office Appliances
Office Equipment News (Canada)
Office Executive
Office Management
Operational Research Quarterly (England)
Operations Research
Pacific Electronics Monthly
Paperwork Simplification
Production
The Programmer
Publishers Weekly
Railway Age
Research for Industry (Stanford Research Institute)
The Spectator
Stores
Systems and Procedures Quarterly
Systems Magazine
Technical News Bulletin
Tooling and Production
United States Investor
U.S. News & World Report
Wall Street Journal
Western Electronic News

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# Training

Management Concepts in Operations Research, sponsored by the Harvey N. Shycon Company

Date: October 28 - November 1, 1957
Place: Boston, Massachusetts (Harvard Club)
Instructors: Eight members of staff of M.I.T.
For whom: Industrial executives
Fee: $225.00
Information: Harvey N. Shycon Company, Park Square Building, Boston, Massachusetts

Installing an Electronic Data Processing System (Course 20), sponsored by Canning, Sisson and Associates

Date: October 28--November 1, 1957
Place: New York (Barbizon Plaza Hotel)
Fee: $250.00
Content: This course is a logical continuation of Course 10, Electronic Data Processing for Business and Industry. It is desirable, but not required, that attendees have taken Course 10 or its equivalent. Organization, Personnel, Physical Installation, Conversion, Operation.
Information: Canning, Sisson and Associates, 1140 South Robertson Blvd. Los Angeles 35, California

Electronic Data Processing for Business and Industry (Course 10), sponsored by Canning, Sisson and Associates

Date: December 2-6, 1957
Place: Chicago (Sheraton Blackstone Hotel)
Fee: $250.00
Information: Same as above course

Engineering and Management Course, University of California, Los Angeles

Date: January 27--February 6, 1958
Place: Los Angeles, California
For whom: Engineers and managers, all levels
Subjects: Operations research, electronic data processing*, management decision-making, industrial engineering, etc. Twenty-five courses in all.
Cost: $350
Information: Edward P. Coleman, Coordinator, Engineering and Management Course, College of Engineering, University of California, Los Angeles 24, California

* This course is similar in content to Canning, Sisson's "Electronic Data Processing for Business and Industry."

Installing an Electronic Data Processing System (Course 20), sponsored by Canning, Sisson and Associates

Date: February 17-21, 1958
Place: Chicago (Sheraton Blackstone Hotel)
Content: See same course listed above
Fee and Information: See same course listed above

## UNIVERSITY COURSES

Texas Christian University, Evening College; Ft. Worth 9, Texas
Fall 1957 and Spring 1958--Mgmt 340: Electronic Data Processing for Business and Industry
Fall 1957 and Spring 1958--Acctg 348: Accounting and Auditing with Electronic Data Processing Equipment
Courses are one semester, 3-hour, senior year, and lead to BS in Commerce and MBusAd. Tuition $15 sem. hr. or $45 each course. For information, write: Dean, Evening College

Yale University, School of Engineering; New Haven, Connecticut
Industrial Administration, Graduate Courses--includes Course I.A. 125a, Data Processing. For information, write: the Secretary, Yale University

# Meetings

Computer Applications Symposium, sponsored by Armour Research Foundation, of Illinois Institute of Technology

Date: October 24, 25, 1957
Place: Chicago, Illinois (Morrison Hotel)
Fee: $15 for one day (either Thursday or Friday), $25 for both days
Information: J. J. Kowal, Conference Secretary, Armour Research Foundation, 10 W. 35th Street, Chicago 16, Illinois

Third Electronics Business Systems Conference sponsored by the Western Division of National Machine Accountants Association

Date: November 7, 8, 1957
Place: San Diego, California (U.S. Grant Hotel)
Information: G. M. Blakesley, Third Electronic Business Systems Conference, P. O. Box 1448, San Diego 12, California

Operations Research Society of America, National Meeting

Date: November 14, 15, 1957
Place: Pittsburgh, Pennsylvania (Penn-Sheraton Hotel)
Theme: New tools and theory, new applications, and new areas of work

Eastern Joint Computer Conference--"Computers with Deadlines to Meet"

Date: December 9-12
Place: Washington, D. C. (Sheraton Park Hotel)
Information: Malcolm B. Catlin, Council for Economic and Industry Research, Inc., Arlington 2, Virginia

American Management Association Electronics Conference, and EDP Equipment Exhibit

Date: March 3-5, 1958
Place: New York (Statler Hotel)
Information: American Management Association, 1515 Broadway, Times Square, New York 36, New York

Western Joint Computer Conference

Date: May 6-9, 1958
Place: Los Angeles, California (Ambassador Hotel)
Theme: Contrasts in Computers. The last day will be devoted to Reports from the Manufacturers
Information: Dr. Willis H. Ware, General Chairman, care of Rand Corp. 1700 Main Street, Santa Monica, California

International Automation Exposition and Congress

Date: June 9-13, 1958
Place: New York (Coliseum)
Information: Richard Rimbach Associates, Show Management, 845 Ridge Avenue, Pittsburgh 12, Pennsylvania